MERIDIAN COAL EXCHANGE

December 1982

U.S. Department of the Interior
Bureau of Land Management
Miles City District Office
Miles City, Montana

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Miles City District Office
P.O. Box 940
Miles City, Montana 59301

IN REPLY
REFER TO:

Dear Reader:

The enclosed Environmental Assessment (EA) is provided to inform you of the possible environmental implication of a proposed coal exchange west of Circle, Montana between Meridian Land and Mineral Company and the Federal government.

We are particularly seeking comments from individuals who assisted us during the scoping process. Written comments will be accepted until January 3, 1982. Your comments will be used as part of a recommendation to the Montana Bureau of Land Management State Director to assist him with his final decision on the proposed exchange. This document does not address any legal questions or the public interest analysis. Legal questions are beyond the Bureau's scope. The question of public interest will be addressed in the Decision/Rationale Statement.

Comments should be sent to Jim Murkin, Project Manager, Bureau of Land Management, P.O. Box 940, Miles City, Montana, 59301.

Sincerely yours,

Ray Brubaker

Ray Brubaker
Miles City District Manager

SUMMARY

In November 1981, Meridian Land and Mineral Company submitted a proposal to exchange coal ownership interests with the Bureau of Land Management. The purpose of the exchange would be to consolidate the current checkerboarded coal ownership pattern within the Circle West coal deposit. In March 1982, the Montana State Director, BLM, made the decision to further evaluate the exchange proposal.

Subsequently, two tracts were delineated that expanded upon the Circle West I and II mining units that were being considered for the July 1983, Fort Union coal region lease sale. The resulting environmental assessment evaluates the impacts on the physical environment based on the proposed exchange. Subsurface acreage and inplace reserves of the tracts are as follows:

North Tract Acreage	
U.S.	8,128.29
BN (Meridian)	10,826.55
State	1,120.00
Fee (Other)	0.00
Total	20,074.84

South Tract Acreage	
U.S.	10,872.47
BN (Meridian)	11,553.24
State	1,840.00
Fee (Other)	200.00
Total	24,465.71

North Tract Reserves (million tons)	
U.S.	173.60
BN (Meridian)	228.20
State	18.60
Fee (Other)	0.00
Total	420.40

South Tract Reserves (million tons)	
U.S.	181.10
BN (Meridian)	223.30
State	30.20
Fee (Other)	1.10
Total	435.70

Coal quality within the two tracts is essentially the same. The northern tract reserves are contained within a single seam. Weighted average stripping ratio for the north tract is about 6.8:1.

About 23% of the southern tract contains two recoverable seams. The weighted average stripping ratio of the southern tract is about 7.6:1.

The coal seams provide consistent aquifers in this area. Ground water reportedly exists in greater quantity in the northern tract.

About 96% of the northern tract and 99% of the southern tract is utilized as rangeland. The remainder of the tracts is concerned with crop production. Both tracts show the same per acre forage and crop production.

Eighty acres within the northern tract have been determined to be unsuitable for surface mining to protect nesting habitat for ferruginous hawks. A large part of the southern tract has been identified as critical winter habitat for the pronghorn antelope.

The nature of the cultural resource base in both tracts appears to preserve similar information. A greater number of sites occurs on the northern tract.

Royalty and severance tax return to the state and royalty return to the federal government would increase (as compared to the Circle West I, II, III Tracts) if the exchange is approved and development proceeded on both tracts.

Overall socioeconomic impacts are anticipated to be similar to those identified in the draft Fort Union Coal Region Environmental Impact Statement and associated documents, July 1982.

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INTRODUCTION

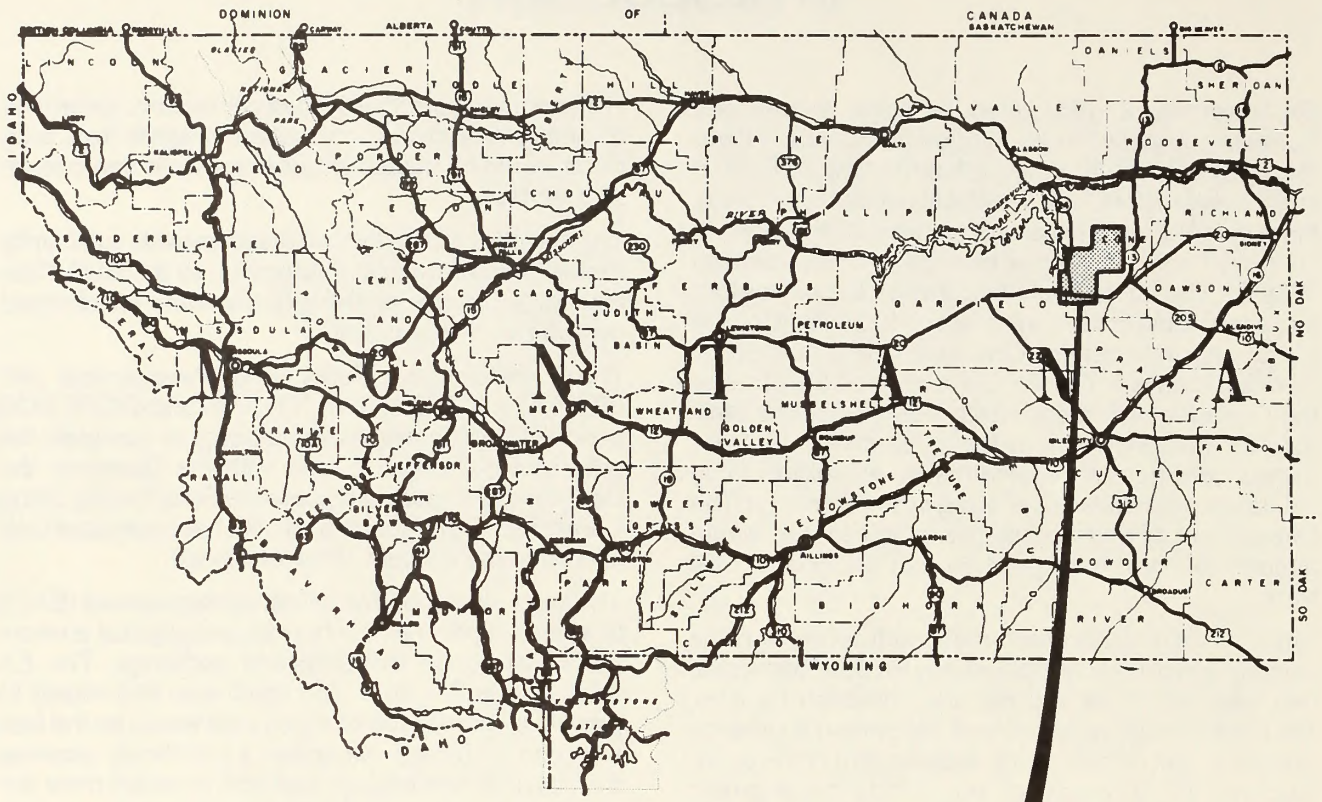
On November 2, 1981, Meridian Land and Mineral Company proposed to exchange with Bureau of Land Management (BLM) checkerboard coal ownership interest within the Circle West coal deposit near Circle, Montana (Map 1). This exchange would be needed to create two separate tracts of blocked-up coal ownership (Map 2). The tracts would be adjacent to one another and each would contain in excess of 400 million tons of inplace lignite reserves. One tract would be held by Meridian Land and Mineral Company and the other by the Federal government, which would be made available for possible lease in the 1983 coal sale. State owned coal (totaling approximately 49 million tons) would not be included or affected by the exchange. The Department of State Lands has indicated they would attempt to lease in conjunction with the Federal coal tract.

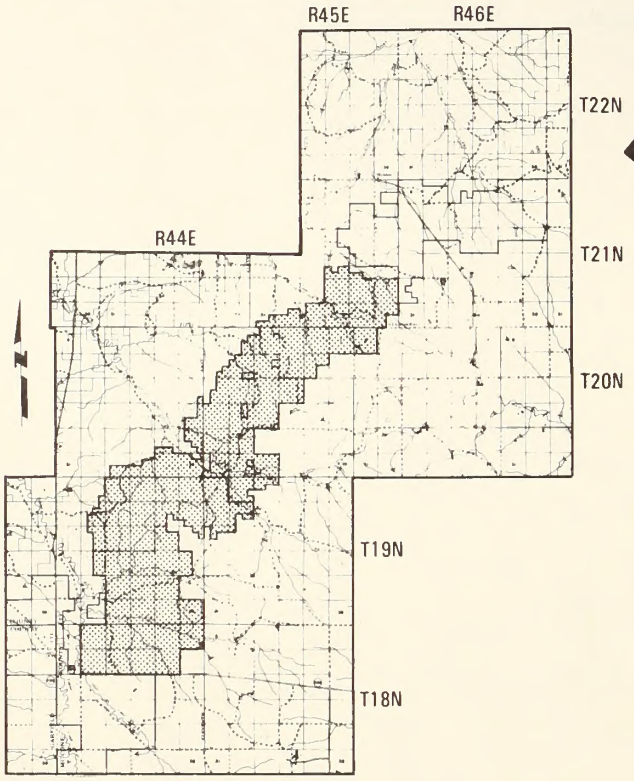
Since lignite requires near mine mouth conversion, the exchange provides the opportunity for development of two adjacent mines and related conversion facilities. Each tract would be capable of supporting a separate operation and remain totally independent of the other. Approval for this type of side-by-side development would have to come from the Montana Facility Siting Council. The possibility exists that the council could authorize only one tract to be developed at a time. Since the larger scale synfuel conversion facilities utilize between 10 and 14 million tons per year, development of one of the tract could be delayed as much as 30 years. On the other hand, based on the large capital investment required for synfuel conversion, some type of joint venture could occur, whereby lignite from both tracts would be utilized simultaneously in one conversion facility.

The objective of this document is to provide sufficiently detailed environmental information to the BLM Montana State Director, enabling him to make an informed decision on this proposal.

The Federal Land Policy and Management Act (FLPMA), 43CFR 2200, 43CFR 2720 and 43CFR 3420 provide BLM the necessary authority to complete the proposed exchange. In talks with the Governor, the Department of State Lands and the State Facility Siting Commission, the Montana officials have indicated their interest in the concept of the exchange.

The purpose of this Environmental Assessment (EA) is to assess impacts on the human and physical environments based on the proposed exchange. The EA addresses both a north and south tract individually to provide a comparison of which tract would be the best selection for federal ownership. It specifically assesses the possible exchange of coal and potential mine disturbance. It does not assess the possible end-use of the coal product nor the impacts associated with a possible plant, as these have been addressed in the Fort Union Coal Region EIS (draft) and associated documents. These documents are available from the BLM Miles City District Office or the BLM State Office in Billings, Montana.

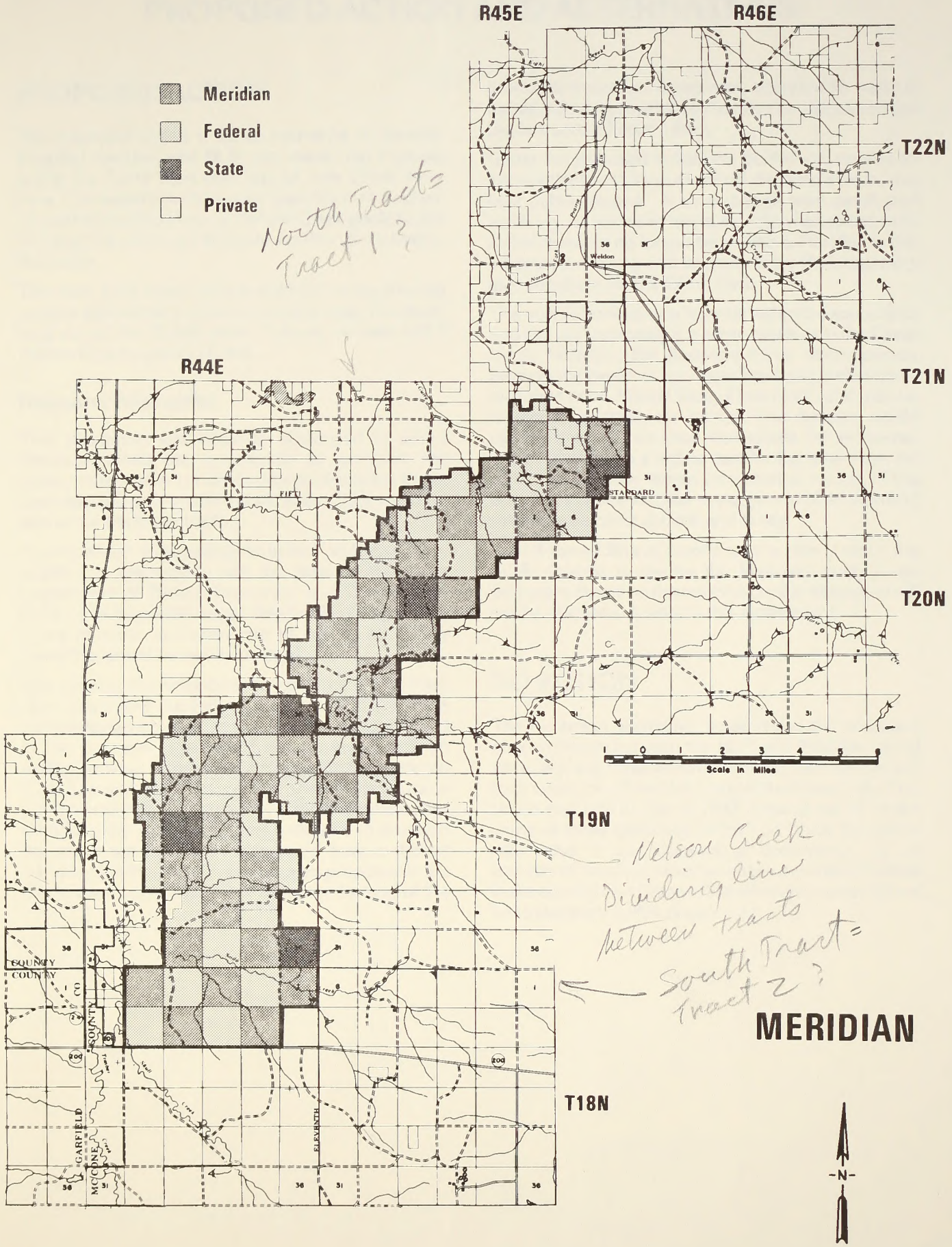




LOCATION MAP
MERIDIAN EXCHANGE

MAP 1

COAL OWNERSHIP MAP



MAP 2

CHAPTER I
PROPOSED ACTION AND ALTERNATIVES

PROPOSED ACTION

The proposed action is for an exchange of checkerboarded Meridian and BLM coal ownership interests within the Circle West coal deposit near Circle, Montana. This would provide two separate tracts of blocked-up coal ownership (Map 3). Nelson Creek would be the dividing line, with one tract to the north and one tract to the south.

The north tract would consist of 20,075 acres. It would contain 420.4 million tons (in place) of coal. The south tract would be 25,466 acres. It would contain 435.7 million tons (in place) of coal.

Redwater Alternative

This alternative was originally developed to afford decision-makers the opportunity to compare the impact of two adjacent developments within the Circle tract versus one development within the Circle tract and one in the Redwater tracts.

A comparison of impacts given in the Fort Union EIS in addition to discussions with the State of Montana's Department of Natural Resources and Conservation (DNRC) indicate that overall development impacts, in terms of social and economic as well as air quality concerns, would be nearly identical.

The existing Memorandum of Agreement with Meridian guarantees the federal government transferable surface leases on either of the Circle tracts as outlined in the proposal. This would not be the case if an exchange were initiated involving the Redwater tracts. Meridian will not guarantee transferable surface agreements if BLM exchanges for the Redwater tracts, therefore, the potential bidders may have to deal with the major surface holder who could have a distinct advantage in bidding. An exchange as proposed in the Circle tract would avoid that situation. As part of the proposed exchange agreement, transferable surface leases must be provided by Meridian for the successful bidders on the Federal tract.

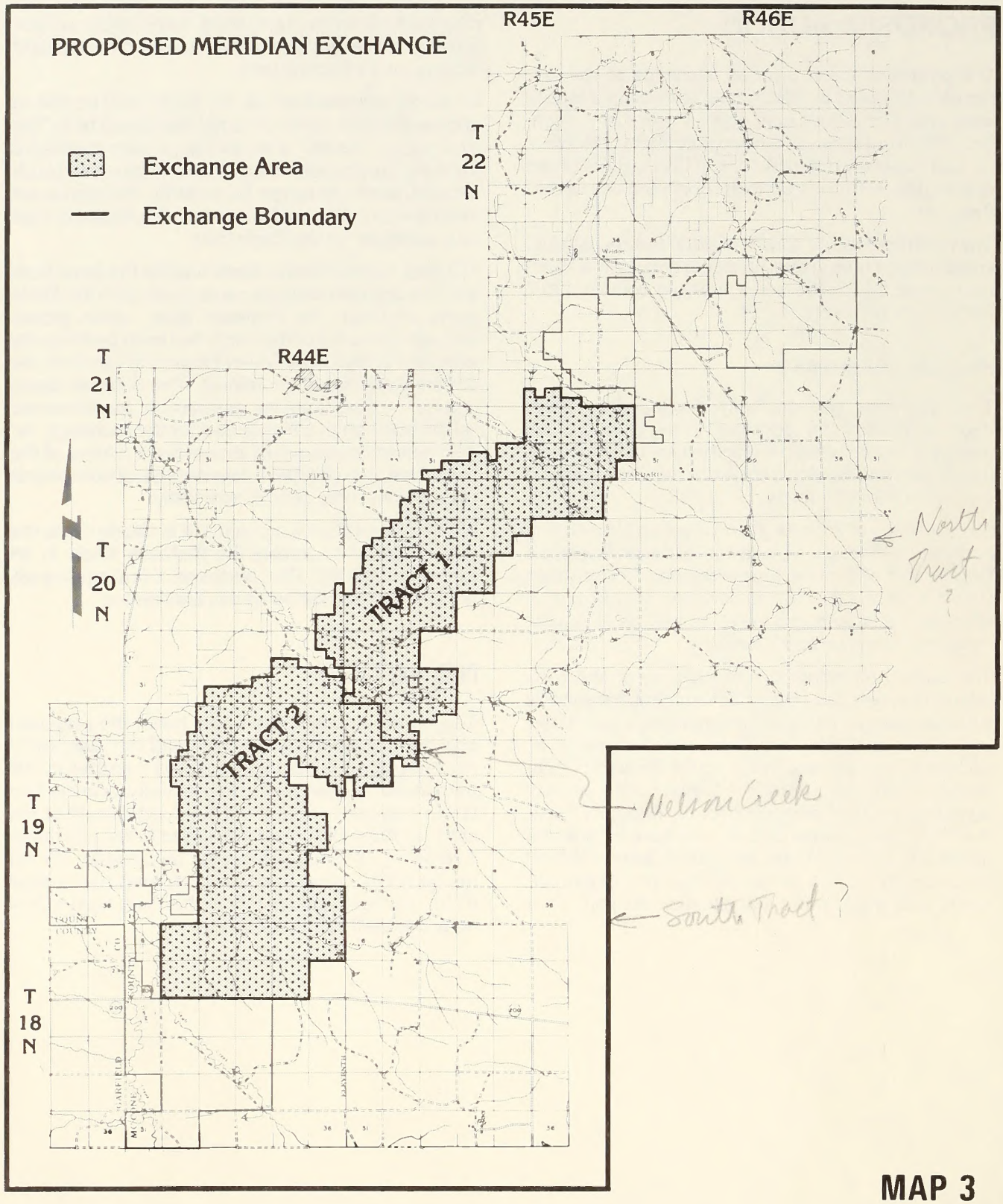
Under the proposed action, the BLM would be able to choose the tract (north or south) that would be in "the best public interest." If an exchange were developed involving the Redwater tracts, Meridian has stated such a choice would no longer be available. Meridian is not interested in taking coal interests in the Redwater tract as a substitute for the Circle tract.

The coal in the Redwater tracts is within the same beds and has approximately the same depth as in the Circle tracts. However, the Redwater River, which passes through the center of the tracts, has been preliminarily identified as an Alluvial Valley Floor (AVF) and may be declared unsuitable for mining. The decision would require a more complex assessment for economic values resulting in a higher cost for the exchange. An AVF determination would also prevent mining of the unsuitable area and make development of economical mining units more difficult and costly.

With these additional problems, it is clearly not in the public interest to involve the Redwater tracts in an exchange. Based on this conclusion, this alternative will not be discussed further in this assessment.

NO ACTION

The no action alternative would mean the proposed coal exchange between the BLM and Meridian would not take place. If this action is adopted, then the Circle III tract would be offered for competitive lease in the Fort Union coal sale in July of 1983. Impacts would be the same as those described in the Fort Union EIS under Alternative III and supporting documents. As all impacts of this alternative have been described in detail in the existing Fort Union EIS, further discussion will not be undertaken in this document.


PROPOSED MERIDIAN EXCHANGE
Exchange Area
Exchange Boundary
R45E
R46E
T 22 N
R44E
T 21 N
T 20 N
T 19 N
T 18 N
TRACT 1
TRACT 2
North Tract ?
Nelson Creek
South Tract ?

MAP 3

CHAPTER II
AFFECTED ENVIRONMENT

LANDS

North Tract = Tract 1 ?

The BLM administers 769.6 surface acres (3.8%) and 8,128.29 subsurface acres (40.5%) of the 20,074.84 acres identified for the north tract. These BLM surface lands are scattered tracts, with the largest being 400 acres in size.

Structures

Buildings for the Dreyer Brothers Ranch are located within the north tract on T21N, R45E, Section 34. This parcel would be subject to unsuitability criterion (#3) prior to inclusion in the north tract. Various fences and corrals also exist within the tract.

Rights-of-Way

County Roads

Approximately 6.5 miles of unimproved county roads are located within the tract. Of this, approximately 2,000 feet of road crosses public land. Five miles of graded road also crosses the tract.

Telephone Lines

Approximately six miles of buried cable lie within the tract. Two branch cables service dwellings in Section 34, T21N, R45E (Dreyer Bros. Ranch).

Powerlines

Approximately three miles of consumer line crosses the tract in Sections 34, 35, and 36, T21N, R45E, with two spur lines servicing the Dreyer Brothers Ranch in Section 34.

South Tract = Tract 2' ?

The BLM administers 1,721.32 surface acres (7.0%) and 10,872.47 (44.4%) subsurface acres of the 24,465.71 acres identified for the south tract. These BLM surface lands are dispersed throughout the tract, with the largest parcel consisting of 640.32 acres.

Structures

One residence and various outbuildings exist on Dan Hinnaland's deeded surface within the NE¼NE¼, Section 26, T19N, R44E. This parcel would be subject to unsuitability criterion (#3) prior to inclusion in the south tract.

An abandoned school house is located in the tract on T19N, R44E, Section 27. Various corrals and fences also exist within the south tract.

Rights-of-Way

No rights-of-way exist on public domain within the tract. The following rights-of-way exist on non-BLM lands.

County Roads

Approximately 11 miles of county road, according to the McCone County Gas Tax Allocation Map, exists within the south tract. All county roads within the tract are unbladed (primitive).

Telephone Lines

All lines within the tract are buried cable. Three miles of cable run along the north boundary of Sections 26, 27, and 28, T19N, R44E, with a short service line located in the NE¼NE¼, Section 26.

Powerlines

A 69 kv transmission line is located along Highway 200, which is the south boundary of the tract. Four miles of a smaller consumer line crosses the tract through T19N, R44E, Sections 21, 22, 23 and 28, with branch lines en route to the Hinnaland residence (Section 26) and to an abandoned school house on Section 27.

GEOLOGY

The tracts are underlain by sandstones, shales, and lignite seams belonging to the Tongue River Member of the Paleocene Ft. Union Formation. Lignite of economic importance occurs in the R and S beds. The R bed is stratigraphically higher and attains a maximum thickness of about eight feet in the southern tract. The bed is usually less than five feet thick in the northern tract. The S bed reaches a maximum thickness of about 22 feet near the dividing line that separates the two tracts. Gradual thinning occurs both to the north and south of the dividing line. The bed thins to less than five feet in the southern tract and to about 12 feet in the northern tract. Under a small area of the southern tract, the S bed splits into an upper seam four feet thick and a lower bed about 18 feet thick. The split is separated by up to five feet of interburden.

Approximate heating and sulfur values for both the north and south tracts are 7,460 BTU/lb and 0.2-0.3 sulfur (%).

In-place lignite reserves, as calculated by the U.S. Minerals Management Service, indicate that the southern tract contains about 435.7 million tons. Calculations were made only where seam thickness was equal to, or greater than five feet. The northern tract contains in-place reserves of about 420.4 million tons. See Table 2-1.

The weighted average stripping ratio (feet overburden to feet coal) for the northern tract is about 6.8:1. The presence of multiple seams would probably increase the already higher mining costs associated with the 7.6:1 weighted average stripping ratio of the southern tract. A more detailed treatment of the economic fac-

tors relating to the two tracts is contained in the Minerals Management Service's coal economic evaluation of the proposed exchange tracts.

The area is underlain by formations that are prospectively valuable for oil and gas, however no production has occurred within the subject tracts.

No other mineral values are known to occur within the two tracts.

TABLE 2-1
Tract Comparison

Ownership	North Tract Acres	Coal 10^6 Reserves	South Tract Acres	Coal Reserves
Federal	8,128.29	173.6	10,872.47	181.1
Meridian	10,826.55	228.2	11,553.24	223.3
State	1,120.00	18.6	1,840	30.2
Fee	0	0	200	1.1
TOTALS	20,074.84	420.4	24,465.71	435.7

HYDROLOGY

Surface Water

The north tract is drained by the intermittent McGuire and Nelson Creeks. The south tract is drained by Timber and Nelson Creeks. Runoff for these creeks averages about 0.4 inch (1,485 acre feet) per year and flows into Fort Peck Reservoir on the Missouri River. Runoff results from snowmelt and intense summer storms. The runoff water is typically a sodium sulfate calcium bicarbonate type with total dissolved solids (TDS) ranging from 300 to 7,700 milligrams per liter (mg/l) (McKinley, 1979). The poorest quality water is contained in ponds and meanders of Nelson Creek (Cameron Engineering 1977). The flows of these intermittent creeks and their tributaries are used by wildlife and for stock watering.

Twenty-three reservoirs are scattered throughout the north tract and 14 in the south tract. They are a major source of water for livestock. Most are filled during spring runoff with all but the larger reservoirs becoming dry by fall due to evaporation and/or leakage.

Ground Water

Ground water in both tracts occurs in several aquifers, the most widespread and predictable being the Colgate Member of the Cretaceous Fox Hills Formation. Wells tapping this aquifer generally reach 1200-1500 feet deep with yields as much as 70 gallons per minute (gal/min) to domestic and stock wells and 200 gal/min to municipal and industrial wells (Stoner and Lewis 1980). Water in this aquifer is characterized by TDS concentrations of 500 to 2000 mg/l with major constituents being sodium and bicarbonate (MBMG 1978). Only two wells in the project area are known to tap this aquifer, both in the north tract at the Dreyer Brothers Ranch.

Abundant and relatively shallow sandstones and lignite seams in the Tongue River Member of the Fort Union Formation make it the most important aquifer in both tracts. However, the sandstones are discontinuous and unpredictable. The only consistent zones containing groundwater are the "R" and "S" coal seams. TDS concentrations range from 1,000 to 4,000 mg/l. Yields from three to 20 gal/min are common. The water is used for domestic and stock watering (EPA recommends domestic water not contain more than 500 mg/l TDS, although domestic wells near the project area with TDS concentrations up to 2,000 mg/l have been reported). Six observation and 15 stockwater wells in the north tract and 13 observation and three stockwater wells in the south tract are known to tap the Tongue River Member.

Alluvial deposits of the Tongue River Member occur in Nelson and Timber Creek drainages. They are locally restricted in aerial extent and exist as sand and gravel lenses and stringers. Yields from 5 to 100 gal/min have been reported with most wells capable of 10-20 gal/min. Water quality ranges from poor to good, being used for both stock and domestic purposes. One well in the north tract is known to tap the alluvial deposits.

Ground water in the north and south tracts is generally topographically controlled. Flow is from recharge areas on divides between tributaries toward and along Nelson Creek, which is the discharge area.

Ground water exists in greater quantity in the north tract than in the south tract, especially in the "S" coal bed. Water quality improves in the direction of the Nelson Creek—Redwater River Divide (Cannon 1982).

Sodium absorption ratios (SAR's) for samples collected throughout both tracts ranged from 7 (medium sodium hazard) to 52 (very high sodium hazard) with the majority showing a very high sodium hazard. Samples, generally showed a very high salinity hazard for irrigation (Cameron Eng 1977). Groundwater in both tracts is generally not suited for irrigation.

CLIMATE AND AIR QUALITY

The semiarid climate of east central Montana, which is typical of the Northern Great Plains, results from the area's extreme inland location. Rapidly changing meteorological conditions are common because of the movement of Pacific and Arctic pressure systems through the region.

The annual mean temperature in the area is 46°F. The highest monthly mean temperature is 75°F (in July), and the lowest monthly mean temperature is 15°F (in January). The growing season averages 158 days at Miles City.

Precipitation in the area is light. Most is in the form of rain in late spring and early summer. Annual rainfall totals about 14.2 inches, and snowfall about 32 inches.

Winds are predominantly from the W to NNW 35 percent of the time and from the SE to S, 27 percent. Windspeed averages 10.6 mph annually and exceeds 11.5 mph 28.6 percent of the time.

Although the terrain offers little obstruction to the dispersion of pollutants, the area experiences prolonged periods of depressed mixing heights and low windspeeds, which tend to concentrate pollutants.

According to total suspended particulates (TSP) monitoring data, annual geometric mean in this area is 25.9 ug/m^3 and the arithmetic mean is 42.5 ug/m^3. The sparse population in the area precludes consideration of the sampler as an urban impacted site. The background level for this analysis was determined to be 42.5 ug/m^3.

No Class I areas fall within the impact range of the proposed tract. Visibility in the area ranges from 45 to 70 miles.

SOILS AND RECLAMATION POTENTIAL

Soils within the proposed exchange area are formed from a variety of parent materials, which include sandstone, siltstone and shale. The landscape consists mainly of undulating to hilly and steep, dissected sedimentary plains. Profile development and depths vary due to parent material, climate, biological forces, topography, and geomorphic stability.

There are 27 soil series in the exchange area as surveyed by the Soil Conservation Service at an order II intensity (McCone County Soils Survey, SCS). The soils are listed in Appendix Tables A-1 and A-2 with information concerning soil depth, erosion potential, reconstruction potential, etc. for both the north and south tracts of the exchange.

LAND USES

Agriculture

Agricultural operations in the tracts consist of: (1) livestock and (2) small grains and livestock (Table 2-2). Most of the farming in both the north and south tracts is dryland. A crop-fallow system is used in the dry farmed areas with mainly wheat or barley being grown. Small acreage is used for other small grains, forage crops or tame pasture. See Table 2-2.

TABLE 2-2
Agricultural Land Use

Land Use	Tract (Acres)	Average Production (Per Acre)	Total Annual Production
	NORTH TRACT		
Cropland	378	28.4 bushels	10,735 bu.
Hayland	264	1 ton	264 tons
Range	19,286	0.277 AUMs	5,342 AUMs
Other	0	0	0
Fallow	147	0	0
Total	20,075		
	SOUTH TRACT		
Cropland	68	28.4 bushels	1,931 bu.
Hayland	165	1 ton	165 tons
Range	24,188	0.277 AUMs	6,700 AUMs
Other	0	0	0
Fallow	45	0	0
Total	24,466		

Vegetation

Approximately 5,342 AUMs of native forage for livestock are produced annually within the north tract and 6,700 AUMs within the south tract. The north tract produces 264 tons of hay while the south tract produces 165 tons of hay. After harvest, cropland acreage is available for wintering a few head of livestock within both tracts.

The vegetation on the tract is a blend of the Prairie County Grassland and the Central Grassland (Payne 1973). The prominent subtypes are steppe grassland, silver sagebrush, big sagebrush and riparian shrub.

The north tract consists of 33% strongly rolling to steep uplands, with 27% in gently rolling to strongly rolling sideslopes. Nearly level to gently rolling drainages make up 40% of the area. The south tract consists of 33% strongly rolling to steep uplands, with 22% in gently rolling to strongly rolling sideslopes. Nearly level to gently rolling drainages make up 45% of the area.

The riparian shrub areas are well defined by the drainage patterns and consist of 5% in the north tract and 6% in the south tract. These areas are important to a variety of wildlife.

Approximately 80 percent of both tracts are in good

range condition, leaving 20 percent in fair or poor condition. (McCone Co. Conservation District 1976).

WILDLIFE

The Circle West Baseline Wildlife Study (MDNRC, 1978), subsequent Monitoring Studies (MDNRC, 1979-1982) and Stoneberg (1982) provide the basis for assessing wildlife populations on the tracts (Map 4).

North Tract

Five of six sharp-tailed grouse display grounds have been identified on the tract and occur over federal minerals. An additional seven display grounds were within one mile of the tract boundary. Some birds undoubtedly use habitats on the tract for nesting, brood-rearing, feeding, wintering, etc. All thirteen display grounds have been active at least one year out of the last six, though only one is known to have been active yearly since 1977.

Of eleven buteo or hawk nests identified on the tract, three have been utilized by ferruginous hawks during the MDNRC study period; two are over federal minerals and one on federal surface. The latter nest, T20N, R45E, in Section 8, was active three out of the last six years. An additional eight nests are within one mile of the tract boundary. Two of the nests outside the tract have been active ferruginous hawk nests. In a separate ferruginous hawk nesting survey, 15 potential nests, including one active nest, were located in an area adjacent to the nest in Section 8. This study concluded that nesting habitat in Section 8 was not unique and that available potential and active nesting habitat is widely distributed (Beak Consultants Incorporated 1982). One prairie falcon nest, active four out of the last six years, and one golden eagle nest, active one out of the last six years, are located within one mile of the tract boundary.

Big game use on the tract was not significantly different from that of areas adjoining the tract. Six years of observations summarized by MDNRC (1982) indicated mule deer winter use of about 21 per square mile in Section 22 just outside the southeastern tract boundary, pronghorn antelope summer use of about 3 per square mile (5-year average) along upper Nelson Creek (Section 5), and pronghorn antelope winter use of approximately 4-7 per square mile in the southeastern corner of the tract. See Map 4.

South Tract

One sharp-tailed grouse display ground (over federal coal) has been located on the tract. Only one raptor nest used by a red-tailed hawk pair, has been identified. A summary of big game observations during the MDNRC studies (1982) indicated mule deer winter use of about 4 deer per square mile in Section 27 just outside the northwest boundary. Pronghorn antelope summer use of approximately 3-7 per square mile (5-year average) over about nine sections or about one-fourth of the tract, and winter use of between 3 and 18 pronghorn antelope per square mile was identified over about four sections. Stoneberg (1982) confirmed this was significant winter range, finding higher densities than for the total hunting district. Considerable variation occurred in year-to-year and month-to-month densities on the tract. Use of the area appeared to be a significant part of a larger winter range with movement throughout and across the tract. Stoneberg (1982) identified a 75-square mile area south of Nelson Creek and including the south tract which represented about five percent of the total area of hunting district 650 and contained up to 19 percent of observed antelope. The tract is also part of a migration corridor between summer and winter range and appears to be used most heavily during more severe winters (Stoneberg 1982).

CULTURAL RESOURCES

North Tract Prehistoric and Historic Features

A total of 960 acres have been intensively inventoried within the north tract (Deaver 1982). This constitutes a 5% sample of the tract and 11% sample of the surface overlying federal coal.

This survey located one porcellanite quarry and three lithic scatters; one of these functioned as a short-term camp and two functioned as lithic reduction sites. The Montana SHPO has previously been consulted regarding these sites on the context of application of unsuitability criteria (BLM 1982). None of these sites are considered eligible for nomination to the National Register of Historic Places.

Two historic homestead sites were located, dating to the period 1916-1931. BLM is currently consulting with the Montana SHPO regarding the eligibility of these two sites for nomination to the National Register of Historic Places.

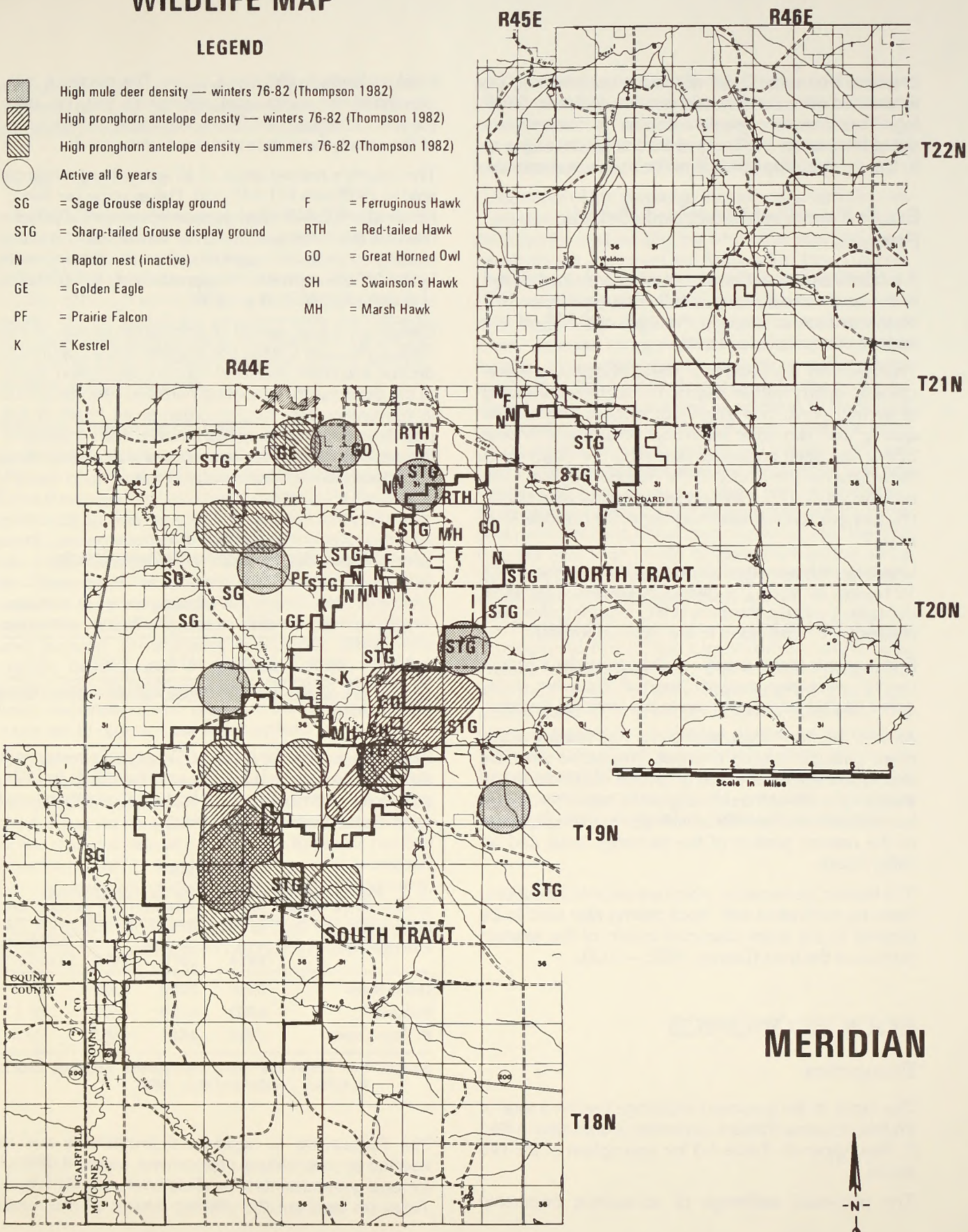
Site distribution patterns of prehistoric sites and historic homesteads contrast, reflecting different adaptive decisions made by prehistoric and historic inhabitants of the area. The prehistoric site settlement pattern is clearly associated with broken, diverse topography. Though sites do exist on gently rolling uplands, it is predicted that site density will increase in the upper reaches of tributaries of third-order drainages in the exchange area, (Deaver 1982:—6-7). This indicates that site density should increase from east to west within the exchange area, as topography changes from gently rolling uplands to more dissected breaks. In

WILDLIFE MAP

LEGEND

- High mule deer density — winters 76-82 (Thompson 1982)
- High pronghorn antelope density — winters 76-82 (Thompson 1982)
- High pronghorn antelope density — summers 76-82 (Thompson 1982)
- Active all 6 years

SG	= Sage Grouse display ground	F	= Ferruginous Hawk
STG	= Sharp-tailed Grouse display ground	RTH	= Red-tailed Hawk
N	= Raptor nest (inactive)	GO	= Great Horned Owl
GE	= Golden Eagle	SH	= Swainson's Hawk
PF	= Prairie Falcon	MH	= Marsh Hawk
K	= Kestrel		



MAP 4

contrast, homestead site distribution appears to be associated with relatively level terrain suitable for farming. Therefore, the greater number of homesteads should appear on the floors of third order drainages or in the gently rolling uplands of the tract's eastern side.

South Tract Prehistoric and Historic Features

A total of 2,560 acres have been intensively inventoried in the south tract (Deaver 1982). This constitutes 10% of the surface acreage in the tract and 23% of the surface overlying federal coal.

The inventory disclosed four prehistoric sites; one porcellanite quarry with an historic component consisting of animal pens; one single component porcellanite quarry; and two lithic reduction sites. The Montana SHPO has been consulted regarding the eligibility of these sites for nomination to the National Register. Only one site, 24MC115, the porcellanite quarry with historic component, is considered eligible for the National Register.

One historic homestead site, dating to the period 1920-1931, was located. The Miles City District is currently consulting with the Montana SHPO regarding this site's eligibility for nomination to the National Register.

Five historic stone cairns, or "sheepherder's monuments" were also located. None of these are considered eligible for nomination to the National Register.

As with the north tract, prehistoric and historic settlement patterns display contrast. Prehistoric sites are associated with and occur in greater numbers in the western portion of the exchange area, while the historic homesteads are associated with gently rolling uplands of the eastern portion of the exchange area, and on valley floors.

The historic stone cairns, which are taken to be outlying features associated with stock raising also tend to be located in the more dissected terrain of the western portion of the tract (Deaver 1982:—10-2).

SOCIOECONOMICS

Economics

The lands in the proposed exchange involve a total of 44,540.55 acres. Present ownership is displayed in Map 3. See Appendix Table A-3 for description of the two tracts.

The proposed exchange of subsurface ownership involves lands in McCone County. The county is predominantly an agricultural community that has, over the years, changed little. The social and economic basis of the county have thus remained untouched.

The county's market value of all agricultural products sold in 1978 was $21,040,000. The average per farm/ranch was $46,445 which is approximately $2,000 less than the state average per farm.[1] Wheat farming is the leading contributor to agricultural production followed by cattle. Wheat produced approximately $13,000,000 and cattle $6,200,000 in 1978[1].

Except for a brief period of population growth in the 1960's, McCone County has experienced a population decline and little turnover in resident population. Much of the decrease in population mirrored national trends in movement from rural to urban areas. Much of this population outmigration has resulted from changes in the agricultural industry as well as a lack of diversified job opportunities in the county (Table 2-3).

TABLE 2-3
Population by Year for McCone County

1950	1960	1970	% Change 1960-1970	1980	% Change 1970-1980
3,258	3,321	2,875	-13.4	2,707	-5.8

Source: U.S. Bureau of Census, Current Population Reports, Series P-23.

Per capita income for McCone County falls below both the Montana and the U.S. averages (Table 2-4). In 1974, per capita income surpassed both, due mainly to good agricultural production that year.

TABLE 2-4
Per Capita Income ($) for Selected Years

	1974	1977	1979	% Change 1974-1979
United States	5,428	7,035	8,727	+60.7
Montana	4,982	6,020	7,528	+51.1
McCone County	7,218	4,661	4,942	-31.5

Source: Fort Union EIS Social Assessment Technical Report, BLM-Miles City District Office, 1982.

The fluctuations in agricultural production due to weather or other natural phenomena, makes it difficult for local governments to predict revenues in the future. Taxes on land are the primary source of municipal

[1]1978 Census of Agriculture, U.S. Dept. of Commerce, Govt. Printing Office, Washington, D.C. 1981

revenues. Municipal bonds are not popular and county mill levies are near the maximum allowed (Fort Union EIS Social Assessment Technical Report).

Social Conditions

In the past decade, oil and gas activity in Dawson and Richland Counties has caused small population booms that led to the expansion of the social and economic environments in Sidney and Glendive. In McCone County, although some peripheral oil and gas related growth has occurred, the predominately agricultural character of the area remains. See the Fort Union EIS, pages 96 to 98 for a detailed discussion of the existing situation in these counties.

Attitudes Toward the Exchange

General attitudes toward energy development in the affected counties are discussed in the Fort Union EIS. Several surveys that have been completed in the past 5 years indicate that the residents of these three counties are divided on whether or not coal development should take place, although many see development as inevitable. Because of the different ways in which data was collected, the survey results vary a great deal. However, survey results indicate that in all three counties, those who support development outnumber those who oppose development. In McCone County, attitudes toward development were often split along agricultural lines; respondents who lived in more rural areas were more apt to oppose coal development.

Attitudes toward the Meridian Exchange proposal have not been directly assessed, although interested parties have had the opportunity to comment. The comments received represent a diversity of opinion. Those in favor of the proposal believe it will provide the same positive benefits as energy development in general. Increased job opportunities, stimulation of the local economy, and serving the national need for energy by providing two economically viable units of coal for production rather than one. In McCone County, the Circle Chamber of Commerce and People for Economic Progress (PEP), an organization which was formed to counteract negative reaction to the issue of coal development, have endorsed the exchange. PEP represents both local businessmen and some rural residents.

Opponents of the exchange include organizations that represent coal producers that might be competing with Meridian for coal leasing, but who otherwise favor coal development (National Coal Association, North Dakota Lignite Council and the Mining and Reclamation Council of America). Also included, of course, are those who have historically opposed any coal related development. Reasons for opposition by the former groups include: the exchange would provide an unfair advantage to Meridian and fair market value for the coal to be mined may not be obtained. In addition to traditional reasons for opposition to coal development, the latter group believes the exchange would interfere with surface owner consent and local residents would lose any control over how, when and where coal is developed. Both groups agree the exchange would not be in the best public interest. Other comments included the idea that this exchange would be precedent setting and it would be better if the BLM developed an official policy on exchanges before examining specific situations.

The Northern Plains Resource Council and the McCone Agricultural Protection Organization, which was created to act as a spokesgroup for area agriculturists who were concerned about impacts to the area's agricultural land, air and water resources, have come out strongly against the exchange. Based on comments received during the scoping process, there appears to be some anti-BN sentiment in McCone County; this affects some people's attitude toward the exchange over and above the reasons previously mentioned.

CHAPTER III
ENVIRONMENTAL CONSEQUENCES

LANDS

Both tracts will be addressed simultaneously in this section, as impacts to both areas are similar in nature.

Dependent upon surface owner consent, the structures on the Hinnaland and Dreyer Brothers Ranches would have to be removed, or the affected lands deleted from their respective tracts. The abandoned school house on the old schoolhouse site in T19N, R44E, Section 27 would also require removal.

Relocation of fencing and corrals would also occur, congruent with the advancement of the actual mining operation.

Existing powerlines, phone cables, and county roads would be relocated prior to mining the tracts. The existing roads would be replaced with improved all-weather roads, which would access the mining operations.

GEOLOGY

Innumerable factors can and probably will affect how, when, and if development would take place in this area. (See Economics Chapter III.) If the U.S. selects the north tract, the U.S. Government would receive 10,826.55 acres of subsurface and 228.2 million tons of coal reserves. Meridian Land and Minerals would receive 10,872.47 acres and 181.1 million tons of coal. The U.S. would lose 45.92 acres of subsurface and gain 47.1 million tons of coal reserves.

If the U.S. selects the south tract, the U.S. would receive 11,553.24 acres and 223.3 million tons of coal reserves. Meridian Land and Minerals would receive 8,128.29 acres and 173.6 million tons. The U.S. would gain 3424.95 subsurface acres and 49.7 tons of coal reserves (see Table 2-1).

Should development occur, the lignite removed by mining and that portion left by current strip mining technology would be lost from future use. In addition, the R bed would probably not be recovered from areas where seam thickness is less than 5 feet.

HYDROLOGY

The north and south tracts are similar hydrologically. Effects of mining are expected to be essentially the same for both tracts.

The industrial water supply for on-site coal conversion for both tracts can be obtained from Fort Peck Reservoir (Water Reservations and Current Water Availability in the Yellowstone River Basin 1981). Drinking water for mine personnel could be supplied by deep wells (1200-1500 ft) tapping the Fox Hills-Hell Creek aquifer without affecting other users. Water collected from mine pit dewatering could be used for dust suppression and other related mine activities.

Existing wells within the tract that tap the "S" coal seam or aquifers above it would be destroyed or severely affected by mining. They could be replaced by wells drilled into deeper aquifers. Yields and water quality would be approximately the same as existing wells. Based on studies from the Powder River coal region, mining could lower water levels in wells that utilize the "S" coal seam or aquifers above it that are down-gradient and within three miles of the tract boundaries (Hardaway and Kimball 1979, Van Voast, et al 1978, Dolhopf et al 1978). It could take several years for water levels to recover.

Groundwater quality inside the tract boundaries would show higher TDS concentrations as water reinvades reclaimed spoils. It might take several hundred years to return to premining conditions (Rahn 1976, Van Voast 1978, Moran, et al 1979). Water quality in wells outside but near the tract boundaries might be degraded following mining. However, Van Voast (1980), and Ahern and Frazier (1981) suggest that the spread of pollutants from reclaimed areas is modified by sorption, chemical precipitation and dilution as water re-enters coal bed aquifers. Groundwater quality degradation may be limited to a hundred feet or less from the tract boundaries.

Surface water channels would be reclaimed to their approximate premining conditions. No significant changes in quantity or quality of flow are anticipated following mining. During mining, sedimentation ponds are required by the State of Montana to satisfy pollutant discharge regulations. Several of these could be left to replace stock ponds lost during mining.

Aqueous wastes from onsite coal conversion would initially be pumped into holding ponds. Discharge from these ponds must satisfy the State of Montana's Pollutant Discharge Elimination System regulations. Hazardous wastes must be disposed of in an EPA approved hazardous waste disposal site. Seepage from holding ponds could enter the near surface aquifer system. Diligent construction of holding ponds by the mining company could prevent this from happening.

The most significant offsite impact from mining would be the strain put on the City of Circle's water supply and sewage treatment facilities. Both systems are currently used to capacity. Increases in population due to mining (see economic and social sections, this chapter) would necessitate revamping both systems. Additional water requirements could be supplied by drilling new wells into the Fox Hills-Hell Creek aquifer. New water treatment and storage facilities would have to be constructed as well as a new sewage treatment facility (Hamman 1982).

CLIMATE AND AIR QUALITY

The major pollutants from mining and conversion would be particulates, sulfur dioxide and nitrogen dioxide. Other pollutants emitted in lesser amounts include carbon monoxide, hydrocarbons, and trace element species.

A site specific evaluation of the environmental consequences of pollutants for the mine area has not been done, however, a modeling study was conducted on cumulative effects of coal mining and conversion for the entire Fort Union Coal Region. Effects for the mine area were then interpolated from the cumulative data.

Computer models used were a modified climatological dispersion model (CDMQC) and MESOPUFF, a model used by the North Dakota State Department of Health. Complete technical details are given in a separate Technical Report (ECOS Management Criteria, Inc. 1982).

Dispersion modeling was performed to predict particulate concentrations for comparison with NAAQS and State of Montana standards. During the peak production mining period, total particulate concentrations are predicted to be about 4,750 tons per year, with best available control technology. See the Ft. Union EIS and related documents for specific prediction of off-site impacts.

Acid precipitation is a serious and growing problem in some parts of the world. "The Debate Over Acid Precipitation-Opposing Views-Status and Research" (U.S. General Accounting Office, September 1981) pointed out that the current state of knowledge of this problem is not sufficiently developed to permit precise quantitative or even reliable qualitative prediction of project consequences.

Should future development occur, gasification emissions would undoubtly contribute acidity to the atmosphere. It cannot be predicted if this contribution would be significant. Site specific modeling based on a specific facility design must be accomplished before a detailed analysis can be made. This should be a part of an ES developed for the facility-siting approval by the State of Montana, should development occur.

The tract and its surrounding areas appear to have a low potential for adverse impacts of acid precipitation. More data is being collected in Montana and North Dakota as well as nationally so that impacts could be evaluated more adequately.

Modeling predicts significant impacts on visibility at Theodore Roosevelt National Park for certain production levels (Fort Union EIS Air Quality Supplement). Visibility impacts do not imply violation of standards, as no regulatory standards have yet been established for visibility at the Park.

No secondary impacts associated with population and economic growth are anticipated. Vehicle emissions might cause noticeable and undesirable pollution under certain circumstances, however, any pollution levels would not likely exceed standards. Effects on water quality resulting from air pollution would likely be insignificant. Local weather around the site might be slightly affected, but compared to natural year-to-year variations, effects would probably be negligible.

No adverse impacts on air quality are anticipated from coal mining or conversion on the project site. Cumulative impacts from all proposed sites in the Fort Union Coal Region appear in the Fort Union EIS and supporting documents.

SOILS AND RECLAMATION POTENTIAL

Mining would have a significant short term impact on soil in the tract. (See Appendix Tables A-1 and A-2.) By the end of mine life in both tracts, (44,540) acres would be disturbed. Soil impacts include: displacement of soil and overburden from wind and water erosion, change in soil structure, natural fertility and soil compaction from haul roads.

In the south tract, 38 percent of the soils have a high potential for wind erosion and 38 percent of the soils have a high potential for water erosion. (See Table A-1.) In the north tract 36 percent of the soils have a high potential for wind erosion and 40 percent of the soils have a high potential for water erosion (Table A-2). Proper seeding of the stockpiles would reduce this erosion potential.

Disturbances of the soil would result in alterations of soil structure and porosity. The alteration would affect permeability, infiltration rates, bulk density soil-air and soil-water relationships. The natural fertility would be affected by disruption of the nutrient cycle, a decrease in microbial activity and organic matter content within the soil. The salt content would increase as a result of the lower calcareous horizons being brought to the surface.

Inherent soil characteristics including soil texture, chemical and physical properties, and erodibility determine the reconstruction potential (based on National Soils Handbook Part II Section 403.6(a)). The south tract is rated for reconstruction potential as 2 percent good, 39 percent fair, and 58 percent poor. The north tract is rated 1 percent good, 46 percent fair, and 52 percent poor.

Suitability of the soil material for plant growth in the south tract is rated as 9 percent good, 35 percent fair, and 56 percent poor. The north tract is rated as 10 percent good, 33 percent fair, and 57 percent poor.

The above percentages only reflect soil information obtained through an order II Soil Survey (SCS McCone Co.). More intensive sampling and analysis would be required to determine the need for selective handling of the spoils, (to meet state-federal guidelines).

The soils rated poor may be reclaimed, but would require more intensive and costly management to be revegetated and stabilized.

LAND USES

Agricultural Production

Exchange resultant mining would have a significant short-term impact on individual agricultural operations in both the north and south tracts. Potential mining disturbance for both tracts totals 44,961 acres.

Assuming a 40-year mine life, an average of 11 acres of cropland, excluding summer fallow and hayland, would be removed from production in the north tract each year. This would be an average annual loss of 312 bushels of wheat. This 11 acres of cropland would be out of production ten to fifteen years with a maximum of about 110 to 165 acres out of production in any one peak mining year, resulting in a maximum loss of about 3,124 to 4,686 bushels of wheat annually. The south tract would probably have all 68 cropland acres removed in one or two years. This 68 acres of cropland would be out of production 10 to 15 years with a maximum loss of 1,931 bushels annually during this period. Note that 10 to 15 years is generally required for bond release. This does not mean that the land is necessarily out of production that long. This will depend on completed reclamation and good to excellent production for the area.

Peak mining year disturbance of 264 acres of hayland in the north tract and 165 acres of hayland in the south tract, would result in an annual loss of 264 and 165 tons for the respective tracts.

Acres of crop and hayland were compiled from 1970 S.C.S. Soil Survey photos and A.S.C.S. information.

Vegetation

An average of 482 acres of rangeland in the north tract would be removed from production each year, resulting in an average loss of 134 AUMs. This 482 acres of rangeland would be out of production 10 to 15 years with a maximum of 4,820 to 7,230 acres out of production in any one peak mining year resulting in a maximum annual loss of 1,335 to 2,003 AUMs.

An average of 615 acres of rangeland in the south tract would be removed from production each year, resulting in an average loss of 170 AUMs. This 615 acres of rangeland would be out of production 10 to 15 years with a maximum of 6,150 to 9,225 acres out of production in any one peak mining year, resulting in a maximum annual loss of 1,700 to 2,550 AUMs.

Chief items of concern on the tract are the riparian shrub subtypes. These areas are vital to many wildlife species. The Montana Department of State Lands will set the standards for establishing a diverse and effective permanent vegetative cover on all rangeland areas, with coordination and cooperation from the Office of Surface Mining and the Bureau of Land Management.

WILDLIFE

Mining would affect habitat supporting at least 12 sharp-tailed grouse display grounds (including some auxiliary or alternate grounds) and an estimated population of 150 grouse on the north tract and at least one display ground and an estimated 20 grouse on the south tract.

Foraging habitat for a golden eagle pair and a prairie falcon pair, with nests adjacent to the north tract, would be affected by mining. Also on the north tract, mining would disturb foraging habitat surrounding three nests utilized in the past by ferruginous hawks. Two of these nest sites would be destroyed and one on federal surface in Section 8 is currently protected by the application of unsuitability criteria to 80 acres in the vicinity of the nest (BLM Memo 1982). Due to the sensitivity of this species to nest disturbance, the nest would probably not be used during mining operations within one mile of the nest. However, following mining operations and accompanying disturbance in the area, the nest would again be available for use without requiring reclamation.

Mining would have no significant impact on mule deer, as use is moderate to light in all seasons. Pronghorn antelope summer and winter range would be affected on both tracts, with probable significant, long-term impacts to essential antelope winter range on the south tract if adequate habitat cannot be reestablished through reclamation.

CULTURAL RESOURCES

The exchange of minerals would result in the loss of federally regulated protection to cultural resources currently located over federal coal.

If coal were to be developed, surface disturbance would result in the destruction of an estimated maximum 31 prehistoric sites, 13 historic homesteads and 50 stone-cairns in the south tract, and an estimated maximum 53 prehistoric sites and 34 historic sites in the north

tract. The effect of mining-related destruction is the loss of information about prehistoric populations that exists in sites, artifacts and their context, both within the site and in the surrounding environment, and the measurable loss of a portion of the finite cultural resource base in eastern Montana.

While not all sites in a mine plan area may be directly impacted, the presence of additional people increases the potential for vandalism, resulting in destruction of site information through uncontrolled collection and loss of integrity and context.

The nature of the cultural resource base is similar in both the north and south tracts. While density is estimated to be higher on the north, the cultural resource base in both tracts appears to preserve highly similar information regarding prehistoric and historic use of this part of east-central Montana.

Based on the existing Class II inventory, BLM would retain a greater number of sites if the north tract coal goes to federal ownership. Though fewer sites are estimated to exist on the south tract, current inventory suggests that stone cairns exist in numbers not duplicated on the north tract; thus a slightly greater diversity of resource types is present on the south tract. BLM would therefore retain a fewer number of sites, but more site types if the south tract coal goes to federal ownership.

According to current inventory, there is not a significant difference in the integrity of the cultural resources vis-a-vis the two tracts.

Pending comment from the Montana SHPO and the Advisory Council on Historic Preservation, BLM will attach stipulations to the exchange agreement obligating Meridian, in coordination with the Montana SHPO, to preserve and protect significant cultural resource values overlying any federal coal they acquire, or to provide for the mitigation of adverse effects on cultural resources, if mining is anticipated.

SOCIOECONOMICS

Economics

From an economic standpoint, "blocking up" subsurface coal lands would make these lands more competitive for possible lease in the future and would forestall bid discounting. Bid discounting is in consideration of the additional risk and expenditures which must be incurred by a bidder to assemble the other non-federal properties necessary to obtain an economical mining unit.

To further enhance the federal tract Meridian has agreed to provide the successful bidder with guaranteed transferable surface leases. Under the current situation the successful bidder would have to deal with a number of different surface owners in order to obtain leases.

Table 3-1 shows a comparison of the possible returns that could be received over the life of the mines (40 years) to the state and federal governments from each tract if all of the coal is mined. The Circle III tonnage figures were taken from the Fort Union Tract Analysis. With an assumed value for coal of $6.00 per ton (see NOTE), the federal government would receive $65,475,000 (one half of minimum federal royalty of 12½%). The state of Montana would receive $924,885,000 in state and federal royalties and severance taxes.

If the exchange is consumated, the tonnage figures would increase because more acreage is involved. At this time, the assignment of tracts has not been determined, therefore federal royalties and the states share (50%) are shown but would apply only to the future federal tract. The north tract would provide $150,675,000, or the south tract $151,650,000, to the federal government and to state government in federal royalties.

In addition the north tract would provide $770,670,000, and the south tract $807,270,000 in state royalties and severance tax. If the exchange is approved the states share of all royalties and severance taxes would increase more than 800 million dollars over the life of development of both tracts.

The federal share of royalties would increase approximately 85 million dollars if the exchange is approved.

At this time, the end-use facilities and possible scenarios are numerous and depend on a variety of uncontrolable factors. The coal is lignite and is not conducive to export for long distances. Therefore the best utilization is mine mouth conversion to support electric power generation plants or some type of synfuel conversion plant (liquefaction or gasification).

We feel that end-use cannot be determined at this time given the present market situation.

Approximately two years ago, this nation was experiencing a shortage of gasoline and prices were rising at an alarming rate. Consequently actions were taken to start planning for methods of providing alternative

NOTE: Prices may vary based on market conditions, contract price, spot market price, BTU rating and sulfur and moisture content. Contract prices have been reported as high as $19.50 to as low as $4.50 (delivered) for comparable coal. Discussions with local geologists and mining companies show $6.00/ton (mine mouth) to be a realistic value.

energy. At present, with a world oil glut, due primarily to conservation methods, these alternative actions have been placed in a "wait and see" position.

New electric power generation facilties have been drastically cut back and future planning is being taken more cautiously.

To date the cost of building gasification plants has been extremely expensive and the price of natural gas has not risen to a level that would make a plant cost effective. However, if natural gas continues to rise at its current rate or technology changes, this type of plant may become feasible in the future.

It is important to remember that market conditions and future changes in technology are the determining factors in deciding the type of plant and when it will be developed. When industry makes this decision, they must submit a mine plan permit EIS and a facility siting EIS. When these are submitted, the impacts associated with development can accurately and specifically be identified. If the exchange is consumated and if the federal tract is leased, local community planners should establish lines of communication with Meridian and the federal lessee to determine future development time schedules at the earliest opportunity.

Local community planners can use the projections that have been published in the Fort Union EIS and supporting documents for a start at developing long range plans. These were the best estimates of conditions at the time of submission and conditions have a tendency to change. Therefore, projections should be used cautiously and should not be considered firm until the mine plan and facility siting EIS's are received.

Mitigating actions that can be taken to assist communities in providing necessary assistance and funding are listed in Appendix I of the Fort Union EIS.

Economics (Agricultural)

If coal is developed some agricultural production would be displaced. To evaluate this issue, it is necessary to compare the value of the agricultural production displaced with that of the coal to be developed. The trade-off is compared two ways.

One way was to compare the net national value of agricultural production displaced with the net national value of coal produced. In this evaluation, it is assumed the net value of coal is 12.5 percent (minimum royalty rate) of the going market rate of $6.00 per ton (lignite).

TABLE 3-1
Tract Comparison

Recoverable Coal		Fed. Royalty	State Share	State Royalty	State Severance Tax
CIRCLE III[1]					
Federal	174.6 M Tons	$130,950,000	$65,475,000		$314,280,000
State	37.8 M Tons			$28,350,000	$68,040,000
Private	249.3 M Tons				$448,740,000
Total	461.7 M Tons	$130,950,000	$65,475,000	$28,350,000	$831,060,000
NORTH TRACT					
Federal or Meridian	401.8 M Tons	$301,350,000	$150,675,000		$723,240,000
State	18.6 M Tons			$13,950,000	$33,480,000
Private	0				
Total	420.4 M Tons	$301,350,000	$150,675,000	$13,950,000	$756,720,000
SOUTH TRACT					
Federal or Meridian	404.4 M Tons	$303,300,000	$151,650,000		$727,920,000
State	30.2 M Tons			$22,650,000	$54,360,000
Private	1.3 M Tons				$2,340,000
Total	435.1 M Tons	$303,300,000	$151,650,000	$22,650,000	$784,620,000

*Fed Royalty if fed owned.
[1]Circle West III Tract Analysis page 4.

The net value of agricultural production is the cash rent to the landowner.

For analysis purposes a "worst case" situation was assumed for agriculture, that is, the area would not be reclaimed. Since agricultural production would be lost on each acre, year after year, these losses were added up to show losses in perpetuity. By comparison, coal output per acre is gained only once. To place agricultural production and coal on the same time basis, it was necessary to discount the value of agricultural output lost in future time periods. Regardless of inflation, a loss in agricultural production in the future is worth less than if it were lost today because of the time value of money.

Under these assumptions, Table 3-2 shows the return to national income from coal production for each tract, assuming the lands are exchanged. The north tract return is 468 times greater than the agricultural production. The south tract would be 475.5 times greater.

Another way of comparing the trade-off between coal and agriculture resources is to determine what coal would have to sell for to be equal to the agricultural production displaced. This avoids assuming all coal in an area could be sold for the going market value. Table 3-2 shows that coal would have to sell for $.00151 per ton in the north tract and $.00150 per ton in the south tract to be equal to the net agricultural value displaced.

Concern has been expressed that extensive strip mining could have an effect on the supply of agricultural land and thus the national food supply.

To gain a perspective on this issue, the value of agricultural production to be potentially displaced by mining can be compared with the value of agricultural output in the consideration area.

Table 3-3 shows mining of the federal coal in the north tract could displace 0.52 percent of McCone County's total agricultural annual output. The south tract could displace 0.53 percent. Both tracts could displace a total of 1.05 percent.

A "worst case" scenario was assumed, in the above comparisons, that the areas would not be reclaimed. Existing state and federal laws require the lands to be returned to the approximate original contour and be reseeded to native species. Evidence collected on current reclamation efforts suggests postmining productivity is similiar to premining productivity, at least in the short term. Long term results are yet to be evaluated as reclaimed lands have not been monitored over a long period of time.

A net energy analysis calculated by the BLM (Washington Memo W.O. 79-282) indicates that an average of 37.7 British Thermal Units (BTUs) would be expended to produce each pound of coal. In turn, a pound of coal would produce about 7,460 BTUs. The ratio of energy produced to that expended would be more than 198:1.

TABLE 3-2
Comparison of Value of Agricultural Production Displaced to Value of Coal Production

		Agricultural Production							Coal Production				
Coal Area	Crop	Acres	Annual Ag. Production	Net Value Per Unit	Total Annual Net Value $[1]	Total Present Value at 10%[2]	Per Acre Loss if Mined[3]	Federal Acres if Exchanged	Tons/ Acre	Net Value Per Ton $[4]	Total Present Value $[5]	Ratio to Equal Ag. Prod.[6]	Value Per Ton to Ag. Prod.[7]
North Tract	Grain	378	10,735 bu	$1/bu	10,735	107,350							
	Hay	264	264 tons	$20/ton	264	2,640							
	Range	19,286	5,342 AUMs	$10 AUM	53,420	534,200							
	Fallow	147	0	0	0	0	32.09	18,955	21,198	0.75	$301,350,000	468 to 1	$.00151
		20,075			64,419	644,190							
South Tract	Grain	68	1,931 bu	$1/bu	1,931	19,310							
	Hay	165	165 tons	$20/ton	330	3,300							
	Range	24,608	6,816 AUMs	$10/AUM	68,160	681,600							
	Fallow	45	0	0	0	0	28.29	21,426	18,875	0.75	$303,300,000	475.5 to 1	$.00150
		24,886			70,421	704,210							

[1]Annual agricultural production x net value per unit

[2]Total present value discounted at 10%

[3]Total present value/total acres

[4]12.5% assumed value of $6.00 at mine mouth

[5]Acres x tons/acre x net value per ton

[6]Total present value (coal)/total present value agri

[7]Agricultural production per acre loss if mined/tons per acre

TABLE 3-3
Comparison of Coal Tract Annual Agricultural Production to County Agricultural Production

		WHEAT			HAY			CATTLE					
County	Coal Tract	Annual Prod.	Annual Sales[1]	Percent of County Sales[2]	Annual Production	Annual Sales[3]	Percent of County Sales[4]	Annual Prod.	Annual Sales[5]	Percent of County Sales[4]	Gross Annual Ag Sales by Tract[6]	Gross Annual Ag Sales by County[7]	Percent of County Ag. Prod. Displaced[8]
McCone	North Tract	10,735 bu.	$34,460	0.27	264 tons	$14,520	0.07	5,342 AUMs	$133,500	.60	$182,480	$35,721,000	.51
							3.4						
McCone	South Tract	1,931 bu.	$6,200	0.05	165 tons	$9,075	0.05	6,816 AUMs	$170,400	.76	$185,675	$35,721,000	.52
							2.1						

[1]1979 Value $3.21 per bushel x total bushels = annual value of wheat production. Montana Agricultural Statistics, Vol XVIII, Dec. 81, Color World Montana, Inc., Bozeman, MT

[2]County wheat sales 1978 - $12,987,000 1978 Census of Agriculture, Dept. of Commerce, Washington D.C., 1981

[3]County hay sales 1978 = 430,000. 1978 Census of Agriculture, Dept. of Commerce, Washington, D.C., 1981.

[4]County cattle sales 1978 = $22,304,000, 1978 Census of Agriculture, Dept. of Commerce, Washington D.C., 1981

[5]AUMs — 12 AUM/cow - cow units x $300 sales per cow unit = value of annual cattle production

[6]Annual sales total for wheat, hay and cattle

[7]Wheat sales $12,987,000 + cattle sales $22,304,000 + hay sales $430,000 = $35,721,000

[8]Gross annual agricultural sales by tract/gross annual agricultural sales by county

Social Impacts

The scope and severity of impacts to social organization and community well-being would vary under the different development scenarios, depending upon changes in population. The town of Circle would experience significant impact to its social organization and well being due to population increase associated with development. The overall impacts to social organization would be substantial, permanent and intense while the impacts to social well-being would be mostly of a short term nature, occuring during development. The impacts to Circle would be similar to those discussed under Alternative 3 of the Fort Union EIS (pp 148-149)

With a large development, impacts to Circle would increase dramatically. These changes would be significantly greater than under a small development because of a substantial increase in the magnitude and growth and the rapidity with which growth would occur. Impacts to social organization would be particularly acute while impacts to social well-being would be significant.

Glendive, Sidney, Richey and Lambert would also experience impacts to their social organization and social well-being although lower relative population growth would mean the impacts would not be as dramatic.

Under any of the exchange scenarios, a portion of the residents of effected communities would likely experience a substantial threat to their sense of personal and community well being; it is expressed that the exchange is not in the public interest, has not allowed for adequate levels of public input, and ultimately may threaten the rights of surface owners both on or adjacent to the tracts in question. The potential for community conflict and stress between groups opposing and favoring an exchange would thus be heightened in the area, likely into the long-term, if the proposed exchange takes place.

TABLE A-1
NORTH TRACT MERIDIAN EXCHANGE SOIL RECLAMATION POTENTIAL

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil 1/ Erosion Potential Wind	Water	Surface Acres	Percent of Area	Soil 2/ Reconst. Potential	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Alona silt loam			x	0-4	Low	Low	191	1	Poor	Excess lime and sodium	-	128	827
Alona silt loam			x	4-8	Low	Mod.	96	1	Poor	Excess lime and sodium	-	64	416
Alona silt loam saline			x	0-2	Low	Low	264	1	Poor	Excess salts and sodium	-	177	1143
Busby fine sandy loam,			x	2-8	High	Mod.	90	<1	Fair	Excess lime	-	450	-
Chinook fine sandy loam							21	<1			23	82	
Cabbart silt loam	x			15-25	Low	High	1713	8	Poor	Excess lime	-	2570	5996
Cabbart-Badland complex; Cabbart-Twilight complex; Busby-Fleak complex	x(.60)		x(.40)	15-45	High	High	4643	23	Fair	Excess lime	985	5145	2517
Cabbart-Kirby complex	x(.53)		x(.47)	8-45	High	High	390	2	Poor	Excess lime, stoniness	8	499	710
Cabbart-Yawdim complex	x(.90)		x(.10)	4-15	Mod.	Mod.	103	1	Fair	Excess lime	3	121	71
Cambeth silt loam;			x	0-8	Low	Mod.	3005	15	Fair	Excess lime	2524	6250	6250
Floweree silt loam							1150	6				3163	4837
Cambeth-Cabbart silt loams	x(.35)		x(.65)	8-15	Low	High	1114	6	Poor	Excess lime	356	958	4256
Cambeth-Twilight-Cabbart complex	x(.30)		x(.70)	4-15	Mod.	Mod.	3803	19	Poor	Excess lime	2700	2320	7416
Floweree-Cambeth silt loams	x(.05)		x(.95)	2-8	Low	Mod.	265	1	Poor	Excess lime	87	408	811
Gerdrum clay loam			x	0-8	Mod.	Mod.	22	<1	Poor	Excess lime, too clayey	-	7	103
Glendive loam		x		0-2	High	Low	60	<1	Fair	Excess lime	-	300	-

TABLE A-1

NORTH TRACT MERIDIAN EXCHANGE SOIL RECLAMATION POTENTIAL

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil 1/ Erosion Potential Wind	Water	Surface Acres	Percent of Area	Soil 2/ Reconst. Potential	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Havre silt loam; Yamac loam, Lonna-Havre Glendive complex			x	0-4	High	Low	83	<1	Poor	Excess lime	-	21	394
							85	<1			14	42	368
							66	<1			-	133	197
Kremlin loam			x	0-4	Mod.	Low	89	<1	Good		238	207	-
Kremlin loam			x	4-8	Mod.	Mod.	97	1	Good		259	226	-
Lonna silty clay loam; Yamac loam			x	0-8	High	Mod.	1664	8	Poor	Excess lime	143	2258	5908
Typic Fluvaguents, saline			x	0-2	Low	Mod.	393	2	Poor	Excess lime	-	-	1965
Ustic Torriorthents-Ustic Torrifluvents association	x(.50)		x(.50)	-	Too Var.	High	205	1	-	Too variable to rate	-	-	-
Yamac loam			x	8-15	High	High	115	<1	Poor	Excess lime	3	8	65
Yamac-Twilight Complex			x(.70 .30)	2-8	High	Mod.	91	<1	Poor	Excess lime	51	70	242
Cambert loam		x		2-8	Low	Mod.	9	<1	Good		3	4	38
Cambert-Cabba loams	x(.40)	x(.60)		8-15	High	High	7	<1	Fair	Excess lime	1	6	18
Shambo loam			x	0-4	Low	Mod.	8	<1	Fair	Excess lime	34	-	6
Bryant-Cambert Complex		x(.50)	x(.50)	2-8	Mod.	Mod.	4	<1	Fair	Excess lime	3	3	14
Cambert-Dast-Cabba complex	x(.10)	x(.60)	x(.30)	4-15	High	Low	49	<1	Fair	Excess lime	18	45	104
Busby-Yetull Twilight Yetull			x(.60) (.40)	2-15	High	Mod.	164	1	Fair	Excess lime, too sandy	144	388	61
Busby-Twilight-Fleak	x(.20)		x(.80)	8-15	High	Mod.	105	1	Fair	Excess lime	49	269	52
Busby-Yamac-Fleak	x(.20)		x(.80)	15-45	High	High	11	<1	Fair	Excess lime	2	26	16
						Total	20,075	100%			7,648	26,348	44,795

Soil Depth

Shallow: 18%
Mod. Deep: 9%
Deep: 73%

Soil Erosion Potential

Wind		Water	
Low	41%	Low	3%
Mod.	22%	Mod.	57%
High	36%	High	40%
Too Variab	1%		

Soil Reconstruction

Good: 1%
Fair: 46%
Poor: 52%
Too Variab: 1%

Suitability of Soil Material for Plant Growth

Good: 10%
Fair: 33%
Poor 56%

TABLE A-2

SOUTH TRACT MERIDIAN EXCHANGE SOIL RECLAMATION POTENTIAL

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil 1/ Erosion Potential Wind	Water	Surface Acres	Percent of Area	Soil 2/ Reconst. Potential	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Alona silt loam			x	0-4	Low	Low	793	4	Poor	Excess lime and sodium	-	531	3434
Alona silt loam			x	4-8	Low	Mod	109	<1	Poor	Excess lime and sodium	-	73	472
Alona silt loam, saline			x	0-2	Low	Low	12	<1	Poor	Excess salts and sodium	-	8	52
Busby fine sandy loam Chinook fine sandy loam			x	2-15	High	Mod.	235	1	Fair	Excess lime	130	921	-
Busby-Twilight complex		x(.30)	x(.70)	2-8	High	Mod.	109	<1	Fair	Excess lime	50	352	55
Busby-Twilight-Fleak complex	x(.20)	x(.25)	x(.55)	8-15	High	High	113	<1	Fair	Excess lime	53	289	57
Busby-Yetull complex			x	2-8	High	Mod.	9	<1	Fair	Excess lime, too sandy	2	40	2
Cabbart silt loam	x			15-25	Low	High	1861	8	Poor	Excess lime	-	2792	6514
Cabbart-Badland complex Cabbart-Twilight complex Busby-Fleak complex	x(.60)		x(.40)	15-45	High	High	5155	21	Fair	Excess lime	1097	5716	2790
Cabbart-Kirby complex	x(.53)		x(.47)	8-45	High	High	1089	4	Poor	Excess lime stoniness	22	1394	1982
Cabbart-Yawdim complex	x(.90)		x(.10)	4-45	Mod.	Mod.	16	<1	Fair	Excess lime	1	19	11
Cambeth silt loam; Flowree silt loam			x	0-8	Low	Mod.	3832	16	Fair	Excess lime	1906	8933	8235
Cambeth-Cabbart silt loams	x(.35)		x(.65)	8-15	Low	High	755	3	Poor	Excess lime	242	649	2884
Cambeth-Twilight-Cabbart complex	x(.30)		x(.70)	4-15	Mod.	Mod.	4131	17	Poor	Excess lime	2933	2520	8056
Floweree Cambeth silt loams	x(.05)		x(.95)	2-8	Low	Mod.	1752	7	Poor	Excess lime	578	2698	5361

1/ Soil Depth Classification and Soil Erosion Potential is derived from McCone County Soil Survey Legend

2/ Soil Reconstruction Potential is derived from the National Soils Handbook

3/ Depth (in acrefeet) of available soil calculated from acres x acrefeet/acre = suitability of soil material for plant growth

TABLE A-2 (cont.)

SOUTH TRACT MERIDIAN EXCHANGE SOIL RECLAMATION POTENTIAL

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil 1/ Erosion Potential Wind	Water	Surface Acres	Percent of Area	Soil 2/ Reconst. Potential	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Havre silt loam Yamac loam; Lonna-Havre-Glendive complex			x	0-4	High	Low	821	3	Poor	Excess lime	44	843	2837
Kremlin loam			x	0-4	Mod.	Low	212	1	Good		566	494	-
Kremlin loam			x	4-8	Mod.	Mod.	165	1	Good		441	384	-
Lonna silty clay loam Yamac loam			x	0-8	High	Mod.	1831	7	Poor	Excess lime	21	1081	1787
Twilight-Yetull complex	x(.05)	x(.55)	x(.40)	8-15	High	High	169	1	Fair	Excess lime, too sandy	164	348	66
Typic Fluvaguents; saline			x	0-2	Low	Mod.	708	3	Poor	Excess lime			3240
Ustic-Torriorthents-Ustic Torrifluvents association	x(.50)		x(.50)		Var.	High	204	1		Too variable to rate	-	-	-
Yamac loam			x	8-15	High	High	15	<1	Poor	Excess lime	3	8	65
Yamac-Twilight complex		x(.30)	x(.70)	2-8	High	Mod.	345	1	Poor	Excess lime	194	266	918
Yamac-Twilight-Fleak Complex	x(.10)	x(.25)	x(.65)	8-15	High	High	52	<1	Poor	Excess lime	28	36	102
Yawdim silty clay	x			2-8	High	Low	29	<1	Fair	Excess lime, too clayey	-	39	-
Gerdrum clay loam			x	0-8	Mod.	Mod.	77	<1	Poor	Excess lime, too clayey	-	25	360
Adger silty clay loam			x	0-8	High	Mod.	3	<1	Poor	Excess lime and sodium	1	1	13
H_2O							4	<1			-	-	-
					Total		24,420	100			8,476	30,460	49,293

Depth

Shallow - 20%
Mod. Deep - 6%
Deep - 74%

Soil Erosion Potential

Wind		Water	
Low	- 42%	Low	- 8%
Mod	- 19%	Mod	-54%
High	- 38%	High	-38%
Too Var.	- 1%		

Soil Reconstruction

Potential

Good - 2%
Fair - 39%
Poor - 58%
Too Var. - 1%

Suitability of Soil Material for Plant Growth

Good - 9%
Fair - 35%
Poor - 56%

TABLE A-3
Tract Descriptions

NORTH TRACT

		Strippable Coal Acres	Exchange Acres	Tons Coal (10^6)	Legal Description (Total Acres)
T20N, R44E					
BN	Sec. 13	38	40	1.1	SE¼SE¼
US	24	239	400	7.5	NE¼NE¼,S½NE¼,SE¼NW¼,E½SW¼,SE¼
BN	25	260	360	9.1	NE¼,E½NW¼,NW¼SE¼,E½SE¼
T20N, R45E					
BN	Sec. 1	364	680.48	10.8	Lots 1 thru 4 S½N½,S½
US	2	580	679.2	16.2	Lots 1 thru 4, S½N½,S½
BN	3	495	678.8	13.4	Lots 1 thru 4, S½N½,S½
US	4	554	628.76	13.6	Lots 1 thru 3, S½N½,S½
BN	5	120	200	3.3	SE¼NE¼,SE¼
BN	7	69	120	2.0	SW¼SE¼,E½SE¼
US	8	509	600	14.3**	NE¼,E½NW¼,SW¼NW¼,S½
BN	9	314	640	9.3	All
US	10	125	640	3.7	All
BN	11	133	480	4.3	N½,SW¼
BN	15	396	640	13.2	All
MT	16	415	640	14.5	All
BN	17	568	640	18.4	All
US	18	365	400	10.9	E½,E½SW¼
BN	19	574	628.12	19.1	Lots 1 thru 4, E½,E½W½
US	20	603	640	21.1	All
BN	21	475	640	17.5	All
BN	29	582	640	21.4	All
US	30	605	628.8	21.2	Lots 1 thru 4, E½,E½W½
BN	31	218	517.47	7.6	Lot 4, E½,E½W½
US	32	517	640	18.1	All
BN	33	172	600	6.2	E½,NW¼,NW¼SW¼,E½SW¼
US	33	40	40	1.4	SW¼SW¼
T19N, R45E					
US	4	48	240.96	1.7	Lots 1 thru 4, S½NW¼
BN	5	543	601.68	20.0	Lots 1 thru 4, S½N½,SW¼,W½SE¼,SE¼SE¼
T20N, R46E					
US	6	150	630.57	4.1	Lots 1 thru 7, S½NE¼,SE¼NW¼,E½SW¼,SE¼
T21N, R45E					
US	22	116	280	2.2	NW¼SW¼,S½SW¼,SE¼
BN	23	22	80	.5	S½SW¼
BN	25	549	640	13.5	All
US	26	574	640	16.1	All
T21, R45E (o.)					
BN	27	602	640	13.7	All
BN	31	53	160	.7	SE¼SW¼,SW¼SE¼,E½SE¼
US	32	276	400	8.2	S½NE¼,S½
BN	33	360	560	9.5	E½,E½NW¼,SW¼
US	34	524	640	13.3	All
BN	35	486	640	13.6	All
MT	36	150	480	4.1	NE¼,W½
Totals		13,783	20,074.84	420.4	
Total US		5,825	8,128.29	173.6	
Total BN		7,393	10,826.55	228.2	
Total State		565	1,120	18.6	

**Unsuitability Application: Criterion 14 affects 160 acres of which 94 are underlain by coal. An exception was applied to 80 acres (S½SW¼). The remaining 80 acres (S½SE¼) have been determined to be unsuitable for surface mining. This determination affects 40 coal acres and 1.1 million tons. These figures are not reflected in the above tables.

		Strippable Coal Acres	Exchange Acres	Total Coal (10^6)	Legal Description (Total Acres)
T18N, R44E					
BN	Sec. 1	236	639.44	5.6*	Lots 1 thru 4, S½N½,S½
US	2	550	638.84	13.1*	Lots 1 thru 4, S½N½,S½
BN	3	640	640.04	15.6*	Lots 1 thru 4, S½N½,S½
US	4	640	640.72	12.3*	Lots 1 thru 4, S½N½,S½
BN	5	572	640.48	8.3*	Lots 1 thru 4, S½N½,S½
US	8	568	640	9.6*	All
BN	9	426	640	10.8*	All
US	10	210	640	5.1*	All
BN	11	355	640	8.7*	All
T19N, R44E					
BN	1	539	640.32	16.0	Lots 1 thru 4, S½N½,S½
US	2	491	641	12.9	Lots 1 thru 4, S½N½,S½
BN	3	609	641.08	15.5	Lots 1 thru 4, S½N½,S½
US	4	476	640.32	10.8	Lots 1 thru 4, S½N½,S½
BN	5	35	40	0.8	SE¼SE¼
US	8	319	360	7.3	NE¼NE¼,S½NE¼,E½SW¼,SE¼
BN	9	480	640	11.3	All
US	10	307	640	7.8	All
BN	11	141	520	3.5	N½,SW¼,NE¼SE¼
US	12	348	640	9.4	All
BN	13	50	120	1.3	N½NE¼,SE¼NE¼
US	14	165	560	4.2	S½NE¼,NW¼,S½
BN	15	581	640	15.3	All
MT	16	640	640	16.2	All
BN	17	345	360	8.8	E½,NE¼NW¼
US	20	166	320	4.2	E½
BN	21	448	640	11.0	All
US	22	640	640	15.7	All
BN	23	540	640	15.1	All
US	24	91	320	2.4	W½
US	26	269	640	9.1*	All
BN	27	640	640	18.5*	All
US	28	413	440	10.1*	E½,SW¼SW¼,E½SW¼
Fee	28	70	200	1.1	NW¼,NW¼SW¼
BN	33	580	640	11.2	All
US	34	640	640	12.4*	All
BN	35	519	640	12.3*	All
MT	36	123	640	3.0*	All
T19N, R45E					
US	6	632	631.59	20.4	Lots 1 thru 7, S½NE¼,SW¼NW¼,E½SW¼,SE¼
BN	7	430	631.88	13.9	Lots 1 thru 4, E½,E½W½
US	8	195	480	6.5	N½,W½SW¼,N½SE¼
US	18	18	200	0.5	NE¼NE¼,W½NE¼,E½NW¼
BN	17	12	40	0.3	NW¼NW¼
T20N, R44E					
US	26	18	120	0.5	S½SW¼,SW¼SE¼
BN	33	215	240	4.9	E½SW¼,SE¼
US	34	260	400	6.8	S½NE¼,S½
BN	35	520	640	14.6	All
MT	36	358	560	11.0	S½NE¼,NW¼,S½
Totals		17,520	24,465.71	435.7	
Total US		7,416	10,872.47	181.1	
Total BN		8,913	11,553.24	223.3	
Total State		1,121	1,840	30.2	
Total Fee		70	200	1.1	

*Includes Both R and S Beds

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